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**Mass spectrometry of metastable species during plasma processing** J.A. REES, S. DAVIES, C.L. GREENWOOD, D.L. SEYMOUR, Hiden Analytical, HIDDEN ANALYTICAL TEAM — Among the techniques in common use for mass spectrometric studies of processing plasmas, the so-called “threshold ionisation” (TI) method for examining the neutral species generated in a plasma has been particularly useful. In the past, the technique has been applied using source pressures in the mass spectrometer of about  $10^{-6}$ Torr. With the current availability of particle detectors which can be operated at much higher pressures, it is of interest to examine possible extensions of the TI technique. The present data for mass spectrometer pressures of up to  $4 \cdot 10^{-4}$ Torr, using gas mixtures which include rare gases, show clearly the generation of long-lived metastable atoms of the inert gases in both the source of the mass spectrometer and in the plasmas. For gases such as oxygen, generation of metastable species in the mass spectrometer source is also observed. The interpretation of the experimental threshold ionisation data is discussed. The measurements suggest new avenues of research for both gas analysis and plasma diagnostics for gases having long-lived, metastable states.

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